

New species and records of Uropodina mites from Iran (Acari, Mesostigmata)

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Abstract

In this paper, a new species of the genus *Nenteria* Oudemans, 1915 is described on the basis of adult female and male specimens collected in soil and litter in parks in Kerman, southeastern Iran, and Tehran, northern Iran. A key to the Iranian species of *Nenteria* is also presented, and *Trachycilliba abantica* (Bal & Özkan, 2007) is reported for the first time in Iran.

Keywords

Trematuridae, soil-dwelling mites, Uropodidae, Uropodina

Introduction

Mites of the infraorder Uropodina occur in forest soil and leaf litter, moss, rotting wood, dung, beach wrack, as well as in the nest of mammals, birds, and insect (Karg 1989, Wiśniewski and Hirschmann 1993, Błoszyk 1999, Maśán 2001, Lindquist et al. 2009). The classification of Uropodina, especially at higher level is not yet stable. For instance, the group was divided into five superfamilies (Protodinychoidea, Polyaspidoidea, Thinozerconoidea, Uropodoidea, Diarthrophalloidea) and 13 families by Lindquist et al. (2009), and into four superfamilies (Microgynioidea, Thinozerconoidea, Uropodoidea, Diarthrophalloidea) and 35 families by Beaulieu et al. (2011).

Halliday (2016) catalogued the genera of Uropodina based on the classification of Beaulieu et al. (2011) and listed 300 genus-group names and their type species.

The Uropodoidea or “higher uropodines” (Evans 1972) is the largest superfamily of Uropodina and comprises over 2200 described species (Wiśniewski and Hirschmann 1993, Beaulieu et al. 2011). Although several attempts have been done to clarify the classification of uropodine mites, the boundaries of several groups of these mites, including the families and genera are not clear yet, such as the genus *Nenteria* that was erected by Oudemans (1915) with the type species of *Uropoda tropica* Oudemans, 1905. Some authors considered *Nenteria* as a genus of Uropodidae (e.g. Krantz and Aniscough 1990, Kadite and Petrova 1977), or placed it in the family Trematuridae (e.g. Karg 1989, Mařán 2001), or in the family Nenteriidae (e.g. Hirschmann 1979, Hirschmann and Wiśniewski 1985, Farrier and Hennessey 1993, Beaulieu et al. 2011, Kontschán 2012, 2014). Hirschmann and Wiśniewski (1985) stated that there were 109 described species of the genus *Nenteria* and divided them into eight species group, and later, in 1993, they mentioned 124 species in the genus (Wiśniewski and Hirschmann 1993).

Iranian mites of Uropodoidea (*sensu* Beaulieu et al., 2011) are poorly known. Until now, only 34 species of this superfamily have been reported in Iran, including three species of the genus *Nenteria* (*N. breviunguiculata* Willmann, 1949; *N. stammeri* Hirschmann & Z.-Nicol, 1962; *N. stylifera* Berlese, 1904) and two species of *Trachycilliba* Berlese, 1903 (reported as members of *Neodiscopoma* Vitzthum, 1943: *N. splendida* (Kramer, 1882) and *N. persica* Kazemi & Kontschán, 2007) (Kazemi and Rajaei 2013, Arjomandi et al. 2013, Arjomandi and Kazemi 2014, in press, Kazemi et al. 2014, Kazemi and Kontschán 2014). The purpose of this paper is to describe a new species of *Nenteria* from Iran, present a key to the species of *Nenteria* occurring in the country, and report a species of *Trachycilliba* that is previously unknown in Iran.

Material and methods

The mite specimens were extracted from soil of parks in Kerman and Tehran cities by Berlese-Tullgren funnels, cleared in Nesbitt’s fluid and then mounted in Hoyer’s medium on microscope slides.

Morphological observations, measurements and illustrations were made using a compound microscope equipped with differential interference contrast and phase contrast optical systems (Olympus BX51). Measurements are given in micrometers (μm). Dorsal shield length and width were respectively taken from the anterior to posterior shield margins along the midline and from the lateral margins at the broadest level. The length and width of the epigynal shield were measured from the anterior to posterior margins of the shield along the midline, and from the lateral margins of the shield at the broadest point, respectively. The length of the second cheliceral segment was measured from the base to the apex of the fixed digit, and its width at the broadest point. The length of the fixed cheliceral digit was taken from anterior level of nodus to the apex, and that of the movable digit from the base to apex. The legs length was

taken from the base of the coxa to the apex of the tarsus, excluding the ambulacrum. Notation for setae on ventral and dorsal idiosoma mostly follows those of Lindquist and Evans (1965).

Taxonomy

Family Trematuridae

Note. The genus *Nenteria* was placed in the family Nenteriidae by Hirschmann (1979), but he never published any diagnosis or description for the family. Although several subsequent authors referred to this family name (such as those mentioned in introduction), the family has never been described, and Nenteriidae remains a *nomen nudum* (Halliday, 2016). We therefore place *Nenteria* in the family Trematuridae, following Karg (1989) and Mařán (2001).

Genus *Nenteria* Oudemans, 1915

Type species. *Uropoda tropica* Oudemans, 1905

Diagnosis. The genus diagnosis of Mařán (2001) was followed.

Nenteria bastanii sp. n.

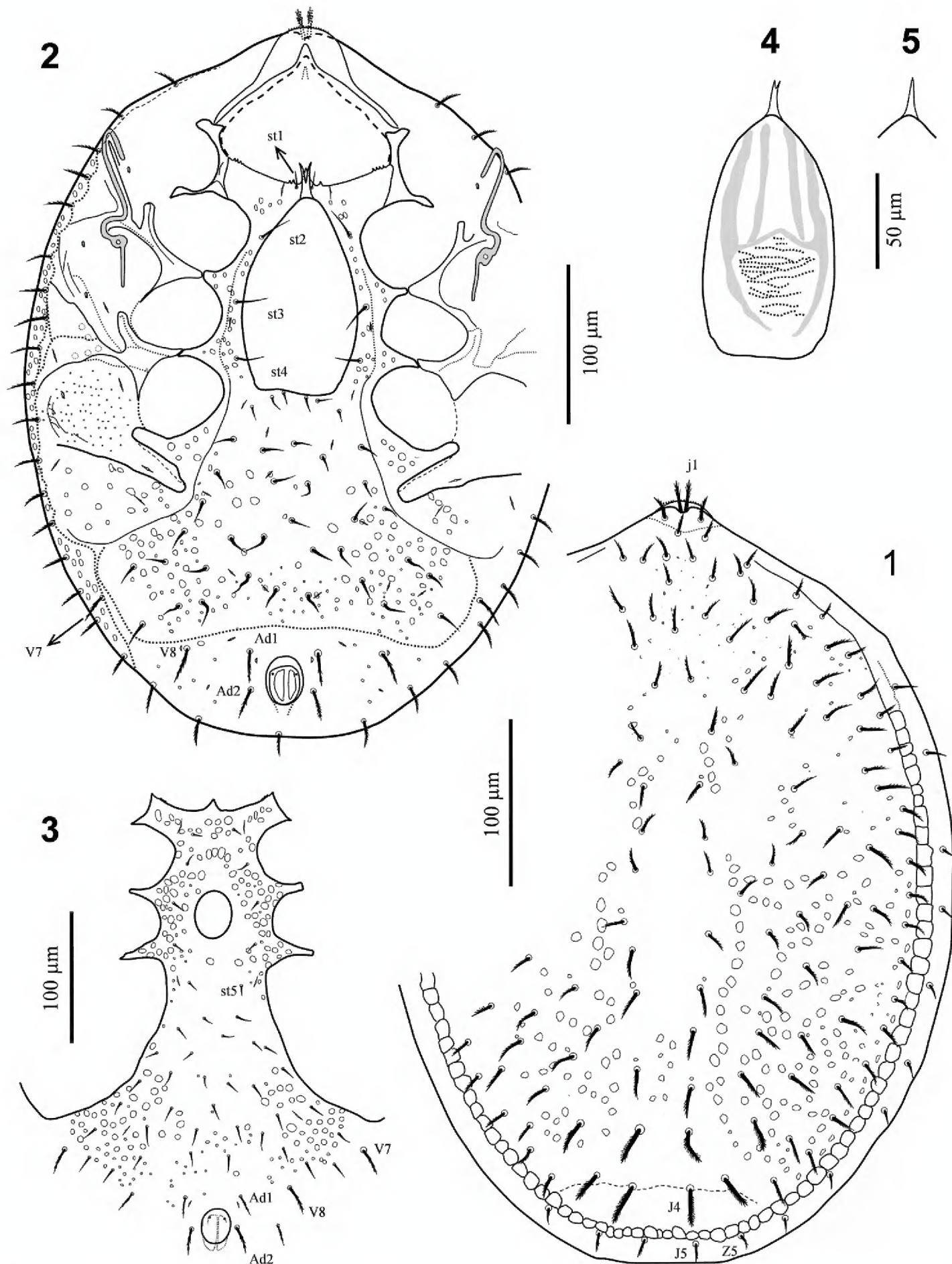
<http://zoobank.org/A4651411-6862-40CD-A76C-C8C9889986E9>

Figures 1–16

Diagnosis (adult female and male). Dorsal shield with 75 pairs of short and pectinate setae, and 2–4 unpaired median setae on propodosomal region. Marginal setae short and smooth, except pectinate setae *J5* and *Z5*. Female epigynal shield iron-shape, posteriorly reaching to mid-level of coxae IV, with an apical anterior spike, occasionally bifid at tip; shield surface smooth. Sternal setae *st1*–*5* smooth. Female ventral region behind epigynal shield bears 22–23 pairs of setae, including *Ad1*–*2* and *st5*, and with 22 pairs in male, excluding *st4*–*5*, setae mostly short and acicular, except *Ad1*–*2*, *V7*–*8* longer and pectinate. Peritremes with a hook-like anterior extensions and without anterior projections to forward. Anterior edge of epistome bifid, without median hyaline flap. Cheliceral movable digit with a median tooth. Claws of leg I well-developed, subequal in size to other leg claws. Dorsal setae in femur, genu and tibia I of male mostly thicker than those in female.

Description. Female (n = 4). Idiosoma oval-shape, brown in color, 461–494 µm long, 336–346 µm wide.

Dorsal idiosoma (Fig. 1). Dorsal shield surface ornamented with sparse sub-circular pits, more densely on opisthonotal region, median region of shield smooth. Dorsal



Figures 1–5. *Nenteria bastanii* sp. n. **1** Female, dorsal idiosoma **2** Female, ventral idiosoma **3** Male, holovenral region of idiosoma **4** Female, epigynal shield **5** Female, anterior spike of epigynal shield.

shield setae 12–30 μm long, mostly slightly pectinate, *j1* (23–24 μm) apically plumose, posterior setae slightly thicker, longer and densely pectinate, *J4* longest (27–30 μm). Marginal shield narrow, bearing nine pairs of smooth and two pairs (*J5*, *Z5*) of

pectinate setae, 12–16 μm long. With 20 pairs of submarginal plus one postanal seta, 18–23 μm long, situated subventrally.

Ventral idiosoma (Figs 2, 4–5, 9). Tritosternal base narrow, cylindrical, 28–31 μm long, 7–9 μm wide, with a pair of small denticles lateromedially and a pair apically; laciniae serrate, 26–31 μm long, apically trifid. Anterior margin of sternal region of holoventral shield with a median projection flanked by 1–2 small teeth; shield surface ornamented with sub-circular pits; sternal setae smooth, *st1* 10–11 μm long, adjacent, inserted near anterior margin of shield, *st2–4* 16–21 μm long, subequal. Epigynal shield iron-shape, 125–136 μm long (excluding anterior spike), 73–84 μm wide, with a relatively long anterior spike (18–20 μm), occasionally bifid at apex, shield surface smooth, posterior margin of shield truncate, ending at mid-level of coxae IV. Ventrianal region of holoventral shield with 22–23 pairs of setae, including *st5*, mostly smooth (12–18 μm), except pectinate para-anal setae *Ad1* (24–26 μm), *Ad2* (22–24 μm) and ventral setae *V7* (19–22 μm), *V8* (21–24 μm). Peritremes without anterior angle of 90°, poststigmatic section 22–26 μm long. Anal opening oval-shape, 34–37 μm long, 24–28 μm wide. Surface between pedofossae III–IV with fine reticulate pattern.

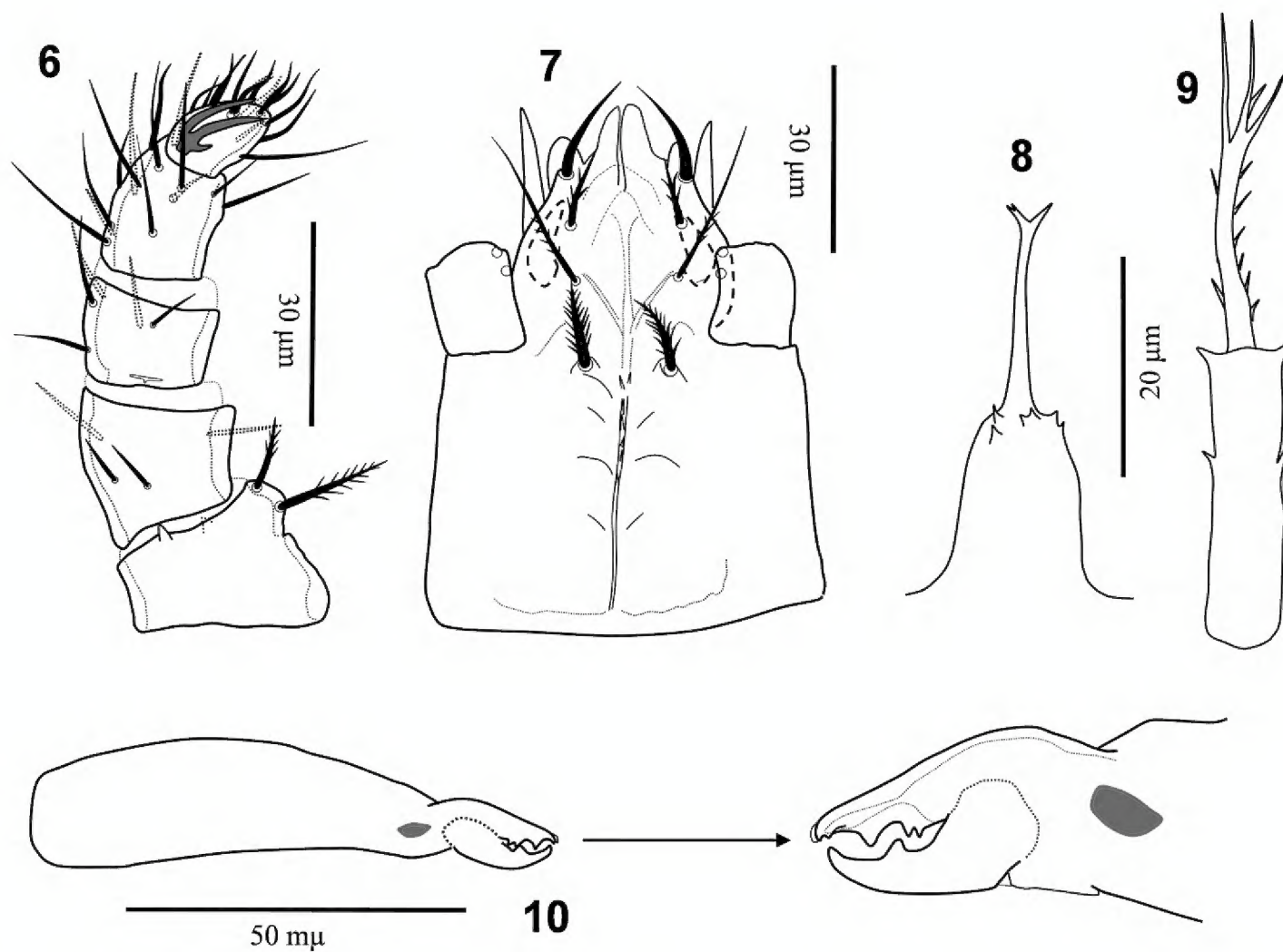
Gnathosoma (Figs 6–7, 9–10). Base of epistome columnar and relatively wide, bearing some small denticulate outgrowths subapically, with a median narrow elongate projection, apically bifid (Fig. 8). Corniculi horn-like (14 μm), ventrally covered by subcapitulum; internal malae and paralaciniae smooth (Fig. 7). Hypostomal setae *h1* (16–18 μm) smooth, thickened, inserted on small protuberances, *h2* (11–15 μm) serrate, *h3* (26–28 μm) elongate, slender, with some barbs in basal half, capitular setae *h4* (14–16 μm) thickened, plumose. Deutosternal groove narrow, with few denticles behind capitular setae. Second segment of chelicera 81–83 μm long, 18–19 μm wide; fixed cheliceral digit 19–21 μm long, with a minute sub-apical denticle, and 2–3 teeth; movable digit 15–17 μm long, with a median tooth. Palp 74–80 μm long; palp chaetotaxy as “*Uropoda*-type” (*sensu* Evans, 1963): trochanter 2, femur 4, genu 5, tibia 14, tarsus 15; all setae smooth, except *v1–2* in trochanter pectinate.

Legs (Figs 11–14, 16). Leg chaetotaxy “*Uropoda*-type” (*sensu* Evans, 1972). All legs with claws; leg I with a long sub-terminal seta (49–54 μm). Chitinous membrane present in coxae I, trochanter I–II, femura I–IV. Lengths of legs I–IV 242–256 μm , 185–198 μm , 192–214 μm and 245–247 μm , respectively. Lengths of femora I–IV 49–55 μm , 53–61 μm , 48–55 μm , 56–62 μm ; genua I–IV 18–21 μm , 21–23 μm , 19–22 μm , 20–24 μm ; tibiae I–IV 17–21 μm , 25–26 μm , 21–24 μm , 23–27 μm ; tarsi I–IV 56–62 μm , 53–56 μm , 56–59 μm , 78–81 μm , respectively. Claws on tarsus I subequal to other legs claws (Fig. 16). Pretarsi I–IV 10–12 μm , 18–20 μm , 17–19 μm , 22–25 μm , respectively. Leg setae mostly narrow, needle-like and short, as figures 11–14.

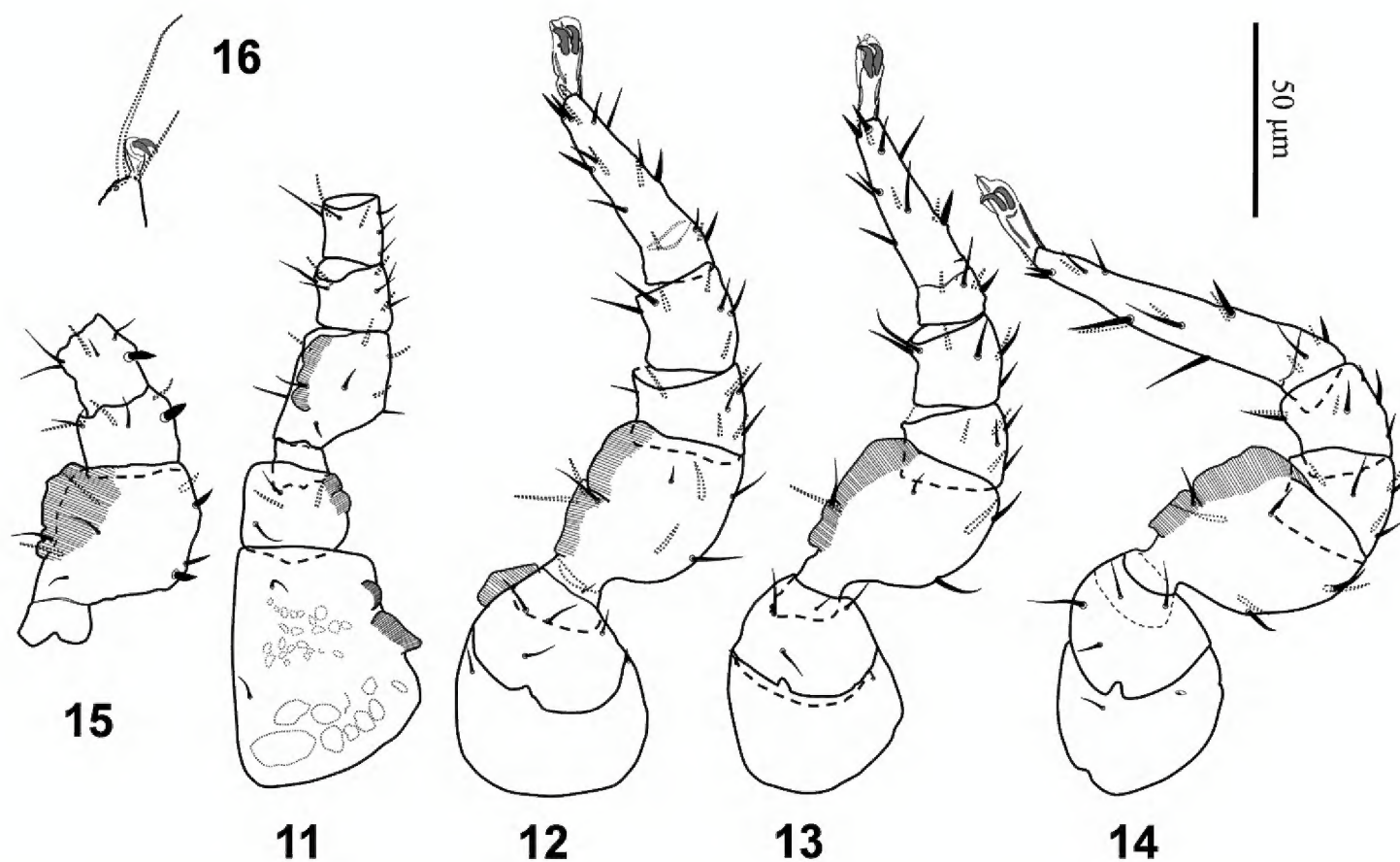
Male ($n = 3$). Idiosoma 440–464 μm long, 343–357 μm wide.

Dorsal shield. Dorsal shield characters similar to those in female. Dorsal shield setae 9–28 long, *j1* 22–24 μm , *J4* 24–28 μm long. Marginal setae 9–14 μm long; submarginal and postanal setae 17–22 μm long.

Ventral shield. Sternal setae smooth, *st1* 10–12 μm , *st2* 17–19 μm , *st3* 13–17 μm , *st4–5* 12–15 μm long. Operculum oval-shape, 38–42 μm long, 25–33 μm wide. Ven-



Figures 6–10. *Nenteria bastanii* sp. n. Female, **6** Palp **7** Subcapitulum **8** Epistome **9** Tritosternum **10** Chelicera.



Figures 11–16. *Nenteria bastanii* sp. n. **11–14** Female, legs I–IV, posterolateral view **15** Male, leg I: femur-tibia **16** Female, apical region of tarsus I and pretarsus.

trial region with 20 pairs of simple, smooth setae (12–15 μm), except pectinate setae *Ad1*–2 (22–25 μm), *V7*–8 (20–23 μm).

Gnathosoma. Hypostomal seta shape similar to those in female, *h1* 14–16 μm , *h2* 12–15 μm , *h3* 29–31 μm , *h4* 14 μm long. Corniculi horn-like (14 μm). Fixed and movable digit of chelicerae similar to female, fixed digit 19–20 μm long, movable digit 15–16 μm long. Palp 73 μm long.

Legs (Fig. 15). Leg chaetotaxy and chitinous membrane similar to those in female, but dorsal setae in femur I, genu I and tibia I mostly thickened in male. Lengths of legs I–IV 232–273 μm , 213–248 μm , 200–212 μm , 236–251 μm , respectively. Lengths of femora I–IV 44–51 μm , 57–61 μm , 56–60 μm , 56–62 μm ; genua I–IV 19–20 μm , 20–25 μm , 21–25 μm , 23–28 μm ; tibiae I–IV 18–20 μm , 20–25 μm , 21–25 μm , 24–27 μm ; tarsi I–IV 55–59 μm , 52–56 μm , 55–59 μm , 82–87 μm , respectively. Pretarsus I 9–12 μm long, pretarsi II–IV 18–22 μm long. Apical long seta on tarsus I 51–56 μm long.

Material examined. Holotype: female, southeastern Iran, Kerman Province, Kerman, Shora Park (30°29'84"N; 57°07'10"E), 1761 m a.s.l., from soil, 28 Sept 2015, coll. S. Kazemi, deposited in Acarological Collection, Institute of Science and High Technology and Environmental Sciences, Graduate University of Advanced Technology, Kerman, Iran (ACISTE). Paratypes: four females and two males with same collection data, deposited in ACISTE; three females and one male, Kerman, Pardis Park (30°29'81"N; 57°07'01"E), 1760 m a.s.l., from soil, 16 Aug 2015, coll. S. Abolghasemi, deposited in ACISTE; two females and one male collected in Tehran Province, Tehran, Taleghani Park (35°45'13"N; 51°25'26"E), 1424 m a.s.l., from soil and litter, 15 Sept 2015, coll. S. Kazemi, deposited in ACISTE.

Etymology. The species is named in honor of the famous current Iranian historian, poet, translator and writer who died in March 2014, Prof. Mohammad Bastani Parizi.

Remarks. The new species can be easily distinguished from other described species of the genus by presence of 22–23 pairs of setae in ventral region of the holoventral shield behind the epigynal plate (including setae *st5*) in female and 22 pairs in male (excluding *st4*–5).

Key to the known Iranian species of *Nenteria* (female)

- 1 Peritreme with an anterior projection, curved to the front in a 90° angle *N. stylifera* Berlese, 1904
- Peritremes without anterior projections to forward 2
- 2 Opisthogastric region behind epigynal shield with 22–23 pairs of setae; epigynal shield with an apical narrow spike *N. bastanii* sp. n.
- Opisthogastric region behind epigynal shield with 9–10 pairs of setae; epigynal shield without narrow apical spike 3
- 3 Surface between pedofossae with oval pits *N. stammeri* Hirschmann & Z- Nicol, 1961
- Surface between pedofossae with reticulate pattern *N. breviungiculata* Willmann, 1949

Genus *Trachycilliba* Berlese, 1903

Type species. *Uropoda splendida* Kramer, 1882.

Trachycilliba abantica (Bal & Özkan, 2007)

Uropoda abantica Bal & Özkan, 2007: 43.

Neodiscopoma abantica.—Kontschán, 2013: 118.

Trachycilliba abantica.—**new combination.**

Studied materials. One female and one male specimens from soil and litter in the Ecological Garden of Nowshahr (51°57'50"N; 40°55'74"E), Mazandaran Province, northern Iran, altitude 30 m a.s.l., 10 June 2014, deposited in ACISTE.

Note. Bal and Özkan (2007) described this species as a member of *Uropoda* Latreille, 1808 *sensu lato* from Turkey. Kontschán (2013) reported it from Greece, and he transferred it to the genus *Neodiscopoma* Vitzthum, 1942, based on the species morphological characters, such as a dorsal shield with a strongly sclerotized median region elevated from other parts; and posteromarginal setae inserted on separate, individual platelets. The genera *Neodiscopoma* and *Trachycilliba* have a same type species, *Uropoda splendida* Kramer, 1882, therefore we placed the species within *Trachycilliba*. Herein, we report *T. abantica* from the Ecological Garden of Nowshahr in northern Iran near the Caspian Sea. This represents the third report of this species in the world.

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References

- Arjomandi E, Kazemi S, Afshari A (2013) Fauna and diversity of the manure-inhabiting Mesostigmata (Acari) in Kerman County, South Eastern Iran. *Persian Journal of Acarology* 2(2): 253–263.
- Arjomandi E, Kazemi S (2014) Edaphic mesostigmatic mites (Acari: Mesostigmata) fauna in parks and landscapes of Kerman City. The Third Insect Pest Management Conference, Kerman, Iran, 21–22 January, Shahid Bahonar University of Kerman, 243–251.

- Arjomandi E, Kazemi S (in press) First report of a genus and species of the family Dinychiidae (Acari: Mesostigmata: Uropodoidea) from Iran. *Journal of Entomological Society of Iran*.
- Bal DA, Özkan M (2007) *Uropoda abantica* n. sp., a new mesostigmatid mite (Acari: Uropodidae) from Turkey. *International Journal of Acarology* 33(19): 41–47.
- Beaulieu F, Dowling APG, Klompen H, de Moraes G, Walter DE (2011) Superorder Parasitiformes Reuter, 1909. In: Zhang Z-Q (Ed.) *Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness*. *Zootaxa* 3148: 123–128.
- Błoszyk J (1999) Geographical and ecological variability of mites of the cohort Uropodina (Acari: Mesostigmata) in Poland. I. Uropodina mites of oak-hornbeam forests (*Carpinion betuli*). Wydawnictwo Kontekst, Poznan, Poland, 245 pp.
- Evans GO (1963) Some observations on the chaetotaxy of the pedipalps in the Mesostigmata (Acari). *Annals and Magazine of Natural History (Series 13)* 6: 513–527. doi: 10.1080/00222936308651393
- Evans GO (1972) Leg chaetotaxy and the classification of the Uropodina (Acarina: Mesostigmata). *Journal of Zoology of London* 167: 193–206. doi: 10.1111/j.1469-7998.1972.tb01729.x
- Farrier MH, Hennessey MK (1993) Soil-inhabiting and free-living Mesostigmata (Acari-Parasitiformes) from North America. An annotated checklist with bibliography and index. *North Carolina Agricultural Research Service Technical Bulletin* 303, 408 pp.
- Halliday RB (2016) Catalogue of genera and their type species in the mite Suborder Uropodina (Acari: Mesostigmata). *Zootaxa* 3972(2): 101–147.
- Hirschmann W (1979) Stadiensystematik der Parasitiformes. Teil 1. Stadienfamilien und Stadiengattungen der Atrichopygidiina, erstellt im Vergleich zum Gangsystem Hirschmann 1979. *Acarologie. Schriftenreihe für Vergleichende Milbenkunde* 26: 57–70.
- Hirschmann W, Wiśniewski J (1985) Gangsystematik der Parasitiformes. Teil 487. Weltweite revision der Gattung *Nenteria* Oudemans, 1915 (Trichouropodini, Uropodinae). *Acarologie. Schriftenreihe für Vergleichende Milbenkunde* 32: 20–24.
- Kadite BA, Petrova AD (1977) Cohort Uropodina Kramer, 1881, Family Uropodidae, Berlese, 1892. In: Ghilyarov MS, Bregetova NG (Eds) *Key to the Soil Inhabiting Mites. Mesostigmata*, Nauka, Leningrad, 632–691. [In Russian]
- Karg W (1989) Acari (Acarina), Milben Unterordnung Parasitiformes (Anactinochaeta) Uropodina Kramer, Schildkrötenmilben. Veb Gustav Fischer Verlag Jena, Germany, 203 pp.
- Kazemi S, Rajaei A (2013) An annotated checklist of Iranian Mesostigmata (Acari), excluding the family Phytoseiidae. *Persian Journal of Acarology* 2(1): 63–158.
- Kazemi S, Kontschán J (2014) Three new records of the superfamily Uropodoidea (Acari: Mesostigmata: Uropodina) from Iran and a key to the known Iranian species of Uropodoidea. *Persian Journal of Acarology* 3(1): 9–16.
- Kazemi S, Hasanvand I, Arjomandinejad A, Jafari S (2014) First report of *Polyaspis patavinus* (Acari: Mesostigmata: Polyaspididae) from Iran. *Applied Entomology and Phytopathology* 81(2): 197–198.
- Kontschán J (2012) Notes on the distribution and taxonomy of the Ecuadorian Uropodina mites (Acari: Mesostigmata). *Opuscula Zoologia (Budapest)* 43(1): 27–42.

- Kontschán J (2013) Uropodina mites of the Balkan Peninsula (Acari: Mesostigmata). *Opuscula Zoologica (Budapest)* 44 (Suppl 1): 97–131.
- Krantz GW, Ainscough BD (1990) Acarina: Mesostigmata (Gamasida). In: Dindal DL (Eds) *Soil Biology Guide*. John Wiley and Sons, 583–665.
- Lindquist EE, Evans GO (1965) Taxonomic concepts in the Ascidae, with a modified setal nomenclature for the idiosoma of the Gamasina (Acarina: Mesostigmata). *Memoirs of the Entomological Society of Canada* 47: 1–64. doi: 10.4039/entm9747fv
- Lindquist EE, Krantz GW, Walter DE (2009) Order Mesostigmata. In: Krantz GW, Walter DE (Eds) *A Manual of Acarology*. Texas Tech University Press, Lubbock, 124–232.
- Mašán P (2001) Roztoče kohorty Uropodina (Acarina, Mesostigmata) Slovenska. *Annotationes Zoologicae et Botanicae* 223: 1–320.
- Wiśniewski J, Hirschmann W (1993) Gangsystematik der Parasitiformes, Teil 548. Katalog der Ganggattungen, Untergattungen, Gruppen und Artender Uropodiden der Erde (Taxonomie, Literatur, Grösse, Verbreitung, Vorkommen). *Acarologie. Schriftenreihe für Vergleichende Milbenkunde* 40: 1–220.